JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2025

B.Tech-IV Semester (CSE/IT/BT/BI)

COURSE CODE (CREDITS): 18B11CI412(3)

MAX. MARKS: 15

COURSE NAME: Design and Analysis of Algorithms

COURSE INSTRUCTORS: Dr. Aman Sharma, Dr. Arvind Kumar, Mr. Ravi Sharma, Mr. Saurav Singh

MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q. No.	Question	CO	Marks
Q1	Calculate the time complexity of the below mentioned codes:	1	4*1

a.

```
void function(int n)
{
   int i = 1, s = 1;
   while (s < n) {
      s = s + i;
      i++;
   }
}
```

b.

```
void fun(int n)
{
   int i = 1;
   while (i < n) {
      int j = n;
      while (j > 0) {
         j = j / 2;
      }
      i = i * 2;
   }
}
```

c.

```
def fun(n,m):
   arr=[[0]*m for i in range(n)]
   for i in range(n):
      for j in range(m):
         k=1
         while k<n*m:
            k*=2
```

d.

```
void fun(int n)
{
   int k = 0;
   for (int i = n; i > 0; i = i / 2)
   {
      for (int j = 0; j < i; ++j)
      {
         ++k;
      }
   }
   cout << k << endl;
}
```

Q2	Find the Time Complexity of the recurrence relation using Substitution Method. T(n) = 2T(n-1)-1, if n>0, 1 , Otherwise	2	3
Q3	Solve the recurrence relation using Master Theorem $T(n)= 2T(\sqrt{n})+\log(n)$	2	2
Q4.	Given an integer array of size N, we want to check if the array is sorted (in either ascending or descending order). An algorithm solves this problem by making a single pass through the array and comparing each element of the array only with its adjacent elements. What will be the worst-case time and space complexity of an algorithm?	1	2
Q5.	A company monitors the stock price changes over 7 consecutive days, represented by the array: **[4, -1, 2, 1, -5, 4, 3]**. The company wants to identify the period with the maximum profit by selecting a continuous subsequence of days. **Question:** Based on the given stock price changes: 1. Identify the subarray that provides the maximum profit. 2. What is the maximum sum of this subarray? 3. Briefly describe how Kadane's Algorithm can efficiently solve this problem. 4. What is the time and space complexity of your algorithm.	3	4

******************************Best of Luck**************************************

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